

titanium nitride film; and

an interconnect overlaying the second titanium nitride film, the interconnect comprising aluminum of small grain size, wherein the second layer of titanium nitride comprises a polycrystalline orientation that comprises a mixture of 1:1 of <111> and <200> oriented grains that are effective for forming the aluminum of small grain size.

45. (Amended) An integrated circuit with an interconnect structure, the integrated circuit comprising:

a first layer of titanium nitride;

an aluminum film of small grain size;

a second layer of titanium nitride between the first layer of titanium nitride and the aluminum film, wherein the second layer of titanium nitride comprises a polycrystalline orientation that comprises a mixture of 1:1 of <111> and <200> oriented grains that are effective for forming the aluminum film [has] of a small grain size.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on November 20, 2002, and the references cited therewith.

Claims 17, 29, 37-39, and 45 are amended; as a result, claims 17-52 remain pending in this application.

§103 Rejection of the Claims

Claims 17, 18, and 20-52 were rejected under 35 USC § 103(a) as being unpatentable over Fiordalice et al. (U.S. Patent No. 5,420,072) taken with Liou et al. (U.S. Patent No. 6,271,137).

The Applicant has amended claims 17, 29, 37, 38, 39 and 45, to describe the second layer of titanium nitride as "comprising a polycrystalline orientation having a 1:1 ratio of <111> to <200> grain size effective for forming aluminum of small grain size."

The Fiordalice patent describes the second layer of titanium nitride as having a grain size of <111>. The Fiordalice patent did not contemplate that a 1:1 mixture of grain size would create an aluminum layer conformable to surfaces having complex topographies. The

Liou et al. reference does not describe the titanium nitride layer arrangement claimed because the Liou et al. reference did not contemplate that a 1:1 mixture of grain size would create an aluminum layer conformable to surfaces having complex topographies either. The combination of the references does not, then disclose the features claimed.

Claim 19 was rejected under 35 USC § 103(a) as being unpatentable over Fiordalice et al. taken with Liou et al. as applied to claims 17, 18, and 20-52 above, and further in view of Matsumoto et al. (U.S. Patent No. 5,654,235). The Matsumoto et al. patent also describes the layer grain sizes as uniform, all $\langle 111 \rangle$ or all $\langle 200 \rangle$. The Matsumoto reference does not describe what is claimed, a second layer of titanium nitride as “comprising a polycrystalline orientation having a 1:1 ratio of $\langle 111 \rangle$ to $\langle 200 \rangle$ grain size effective for forming aluminum of small grain size.” The Matsumoto reference does not suggest that this polycrystalline arrangement is desirable either, either singly or in combination with the other references cited by the Examiner.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 373-6976 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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Date 20 February 03

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 20 day of February, 2003.

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